



Heritage Park

- ❖ Irrigation System Inspection
- ❖ Review of Water Use
- ❖ Estimated Water Budget
- ❖ Potential for Savings

Site Visit: January 17, 2008

Address: 611 Village Drive, Suisun City

Key Action Items

Re-nozzle Rotor Sprinklers

See text for specifics.

Tune Up Sprinklers

Replace Damaged Components. Adjust Sprinkler Arc, Radius and Tilt to Improve Performance at Low Cost.

Modify Irrigation Schedules

Reduce Runtimes, Split Total Runtime into Multiple Cycles (aka "Cycle and Soak") to improve Infiltration of Irrigation Water. Track weather changes and modify schedules.

Estimated
Potential Savings
\$5,200 per year

Introduction

A Landscape Water Management Survey was performed at this site including:

- Irrigation System Inspection and Testing
- Review of Irrigation Water Use
- Estimated Water Budget and Potential for Savings

We found the performance of the sprinkler system to be below average. Deferred Maintenance and Over Irrigation are reducing irrigation efficiency, resulting in water waste, possible damage to pavement and structures and high bills.

Significant irrigation cost savings and improved appearance are possible if this system functioned up to potential.

Please do not hesitate to call if we can answer any questions for you.

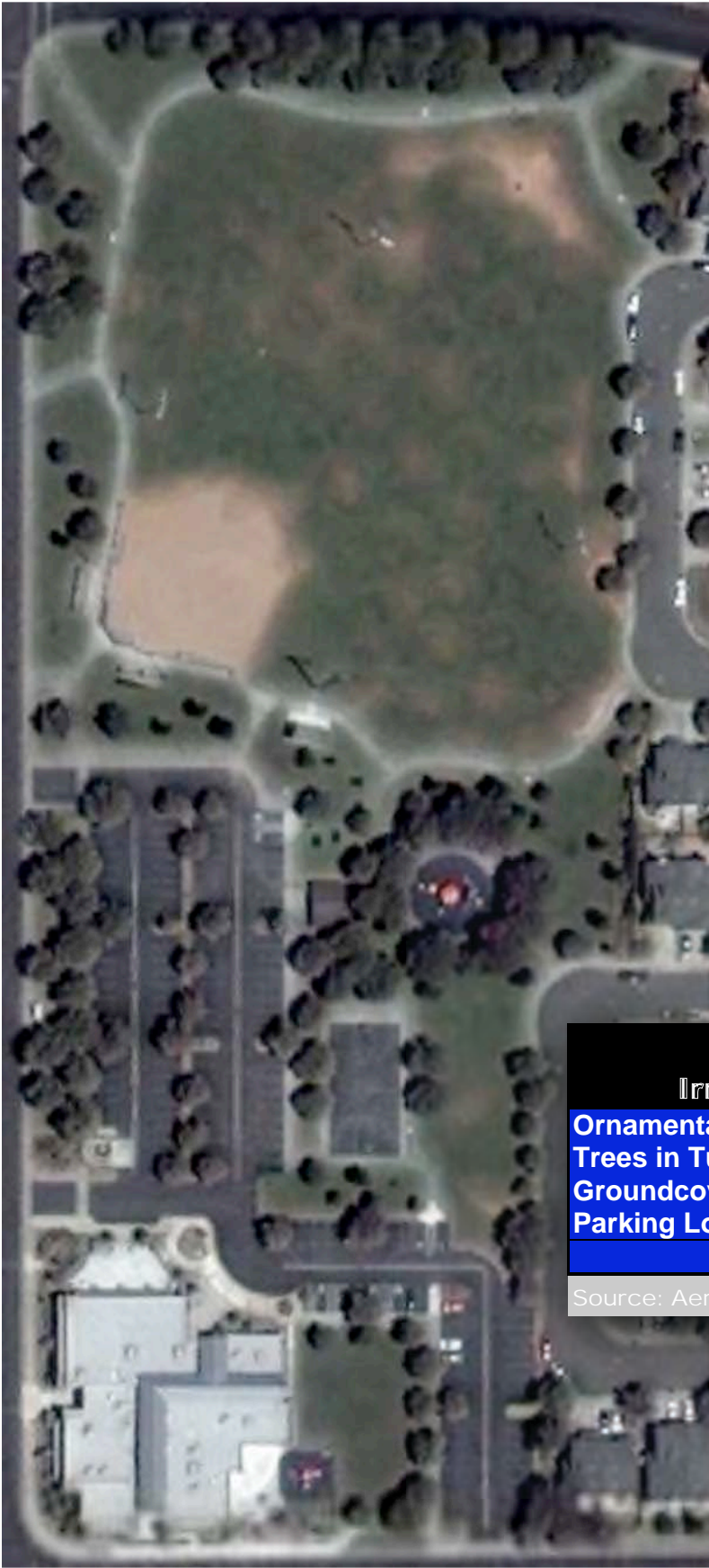
Sincerely,

Gary Kah

Gary Kah (650-799-4909)

Detailed Action Items

1. Low Static Pressure at the Point of Connection (POC) -- 66 PSI instead of the estimated 85 PSI required -- is a critical factor causing poor sprinkler uniformity for the large turf rotors.
2. Nozzle selection for large turf rotor sprinklers is critical. With this site's average Head-to-Head spacing of 50 feet, the suggested nozzle for Hunter I-40 heads would be #42 or 43 versus the #45 installed. Mixed sprinkler types -- I-40 and I-60's on the same valve -- pose additional problems in nozzle selection and sprinkler radius.
3. Range adjustment screws (nozzle retention screws) for full circle rotor sprinklers should not be used to split the water stream of the main nozzle except for those few sprinklers close to the edge of irrigated areas where range reduction is required.
4. Use 360* rotor sprinklers in center field areas and use adjustable arc models only along edges.
5. Repair broken popup spray turf sprinklers.
6. Ensure all sprinklers are at grade to avoid interception of spray by turf.
7. Reduce pressure in popup spray stations from the too-high 50 psi to 30 psi.
8. Edge sprinklers must be aligned to not irrigated hardscapes or adjacent hydrozones. Adjust by twisting the sprinkler body (and adjusting the Arc Screw for rotors) or replacing the fixed arc nozzle in a spray head (with either a more appropriate fixed arc nozzle or an adjustable arc nozzle).
9. Clear clogged nozzles and replace damaged nozzles on spray sprinklers.
10. Track down and eliminate "duplicated station" wiring and battery powered valves using the Department's existing Wire Tracer.
11. Rewire (or re-schedule) all "two valve" (paired) stations so that they do not operate simultaneously to reduce pressure losses and minimize water hammer.
12. Operate edge stations towards the end of the irrigation window (the few hours before dawn); reduce wet sidewalks by running "bus stop" stations as the first edge stations.
13. Trim back excessive runtimes and use multiple cycle starts for all stations. Use at least four programs (each with multiple starts):
Turf Rotors A, Turf Rotors B, Turf Spray C and Shrubs D.
Programs A, B & C should run no more than 3-4 nights per week (A & B on alternate nights) and Program D should not run more than once per week.
14. Create laminated station listings and color station "zone" maps to place in the controller boxes and print up "normal" schedules for Spring, Summer and Fall.
15. Acquire a radio remote to facilitate system checks and repairs.



Irrigated Area

The irrigated area measurements used in this analysis are based on an aerial photograph.

Irrigated Area	Total (SqFt)	Acres
Ornamental Turf	261,300	6.00
Trees in Turf	15,100	0.35
Groundcover, Shrubs, Trees	9,000	0.21
Parking Lot Medians	5,800	0.13
Total	291,200	6.69

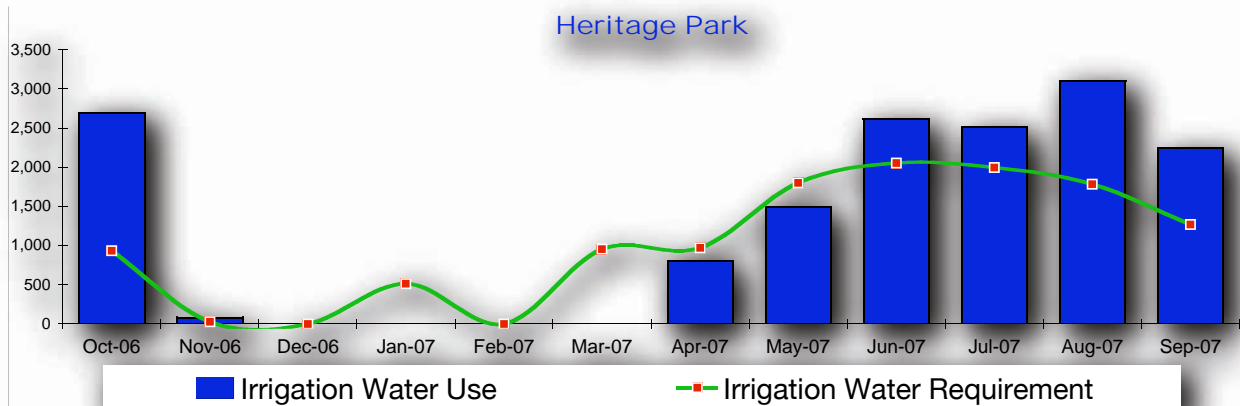
Source: Aerial Photographs and Heads-Up Digitizing

Water Consumption

Water use data was tabulated for 12 months for the two meters that supply water to the site.

Month	Est. Water Use	Est. Target	Est. Net Savings	Cost Savings
Oct-06	2,696	936	1,760	\$1,760
Nov-06	83	27	56	\$56
Dec-06	0	0	0	\$0
Jan-07	0	516	0	\$0
Feb-07	0	0	0	\$0
Mar-07	0	955	0	\$0
Apr-07	804	973	0	\$0
May-07	1,493	1,801	0	\$0
Jun-07	2,613	2,056	557	\$557
Jul-07	2,511	1,996	515	\$515
Aug-07	3,100	1,786	1,314	\$1,314
Sep-07	2,245	1,270	975	\$975
Total	15,545	12,316	5,177	\$5,177

Potential annual savings are approximately \$5,200 per year, assuming the irrigation system is tuned up to operate more efficiently.



Inspection

Sprinkler Condition Analysis - Heritage Park	
<i>Total number of sprinkler heads observed</i>	187
<i>Number of Effective Sprinklers</i>	99
Percent Effective	✗ 53%
Target Percent Effective	80%

Corrective Actions		As % of Sprinklers At Site
Replacement	\$\$\$ Remove and replace with operating sprinkler (requires excavation in most cases)	3%
Alignment	\$\$ Ensure sprinkler is vertical and at grade (may require excavation)	25%
Tune	\$ Adjust radius, arc and (in some cases) nozzle to deliver water to desired area	20%

Field Tests and Irrigation System Performance

Field Tests were performed on representative stations and the results are presented below.

Con-troller	Station(s)	Sprinkler Type	Test Method	Precipitation Rate (inches/hour)	Distribution Uniformity (Lower Quarter)
A	4, 5, 9	Rotor	Catch Can	0.66	50%
C	5	Spray	Flow/Area	2.14	NA
C	5	Spray	Catch Can	1.99	49%

The precipitation rates (higher than desired) and distribution uniformity (lower than desired) in the turf rotor stations were adversely affected by the low pressures and large nozzles (achievable DU = 70-75%). In the spray station, high pressure caused high precipitation rates and water waste through overspray to pavement (achievable DU = 60-65%).

Irrigation Schedules

Due to poor sprinkler condition and low distribution uniformity, provision of irrigation schedules is not possible at this time.

Pending sprinkler replacement, alignment and tuning at this site, sample schedules could be provided and would include all information needed to program electronic controllers for each month, including:

- Minutes per cycle for each station
- Number of days per week to irrigate
- Number of cycles (in other words, start-times) to set for each irrigation day

Irrigation Scheduling Guidelines

- Use Controller Features such as multiple start times (to reduce sprinkler runoff) and Multiple Programs (to vary frequency of irrigation to match rootzone depth and plant type).
- “Trim Back” station runtimes periodically if there are no dry areas. Plan controller start times so that the last sprinkler station finishes irrigating just before dawn.
- Irrigate the areas most sensitive to wind (e.g., sprinkler stations along edges or hard-scape) last, i.e., pre-dawn hours.
- Try new schedules on a test area as a REALITY CHECK before implementing site-wide.

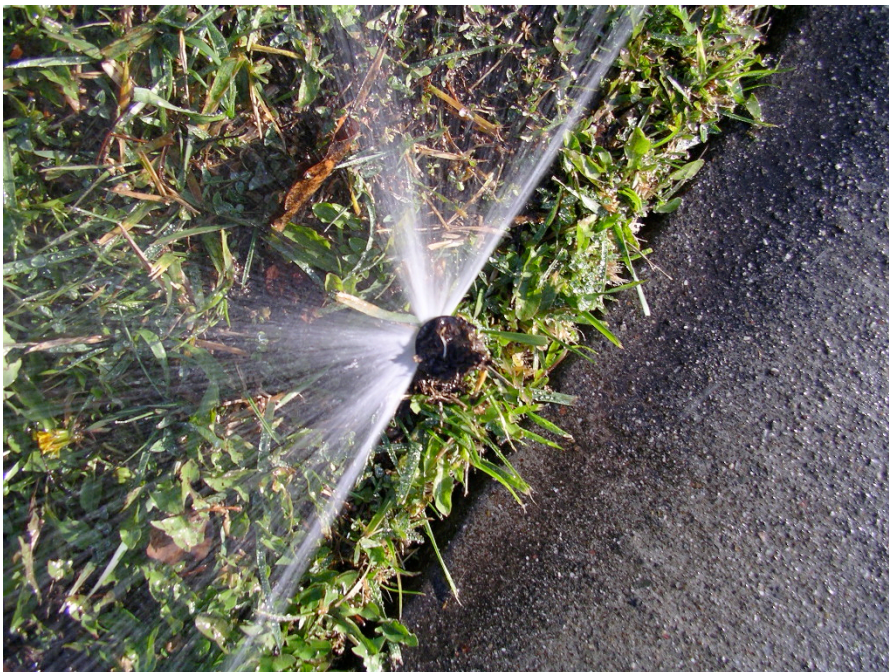
Appendix / Photo Gallery

This gallery illustrates the problems encountered at this site.



Problem: Overspray caused by high pressure (50 psi) and runoff caused by poor alignment on edges.

Solution: Reduce pressure to 30 psi and align sprinklers along edges.



Problem: Nozzles on some of the popup spray sprinklers were blocked or damaged. This causes stress and brown spots in the turf.

Solution: Check and replace nozzles as needed.



Problem: Damaged sprinklers along walk

Solution: Repair, and re-locate inboard of hardscape edge 4 inches or more.



Problem: Overspray in the area of the school bus stop.

Solution: Move station up in the controller “A” firing order. Reduce pressure and align sprinklers along hardscape.



Problem: High pressure in shrub spray station.

Solution: Reduce pressure to 30 psi and align sprinklers along edges.



Problem: Large #45 nozzles, installed with the Hunter I-40 sprinklers, create high flow conditions which reduces pressure in most of the rotor stations.

Solution: Consider re-nozzling with the #42 or 43 nozzles. Do this on an experimental basis before committing to changing a large number of stations.



Problem: Aerial photo showing mottled turf quality probably due to low mains pressure and too large nozzles.

Solution: See Action Items above.



Problem: Rotor sprinkler set too low in the turf causes accumulation of water around the head. This creates soft soil which can destabilize the head. In addition the nozzle retention screw is splitting the main stream of water.

Solution: Raise the sprinkler to grade which allows spray to clear the surrounding turf. Set the retention screw to barely touch the water stream.



Problem: Incorrect nozzle arc for square corner leads to overspray.

Solution: Use proper fixed arc nozzle.



Problem: Incorrect nozzle arc for unusual arc leads to overspray.

Solution: Use adjustable arc spray nozzles as required. Convert narrow turf strips to pavers or cement.